

## ABSTRACT

Apparatus and methods are provided for interacting light with particles, including but not limited to biological matter such as cells, in unique and highly useful ways. Optophoresis consists of subjecting particles to various optical forces, especially optical  
5 gradient forces, and more particularly moving optical gradient forces, so as to obtain useful results. In biology, this technology represents a practical approach to probing the inner workings of a living cell, preferably without any dyes, labels or other markers. The invention includes methods for separating particles in a medium where the particles having differing dielectric constants by providing a medium having a dielectric constant  
10 between the dielectric constants of the particles, subjecting the particles in the media to an optical gradient field, and separating the particles.